WHAT IS CLAIMED IS:

1. A labeled biological probe, comprising:

a first biological moiety selected from the group consisting of a nucleic acid, a peptide nucleic acid, a protein, a steroid and a carbohydrate, said biological moiety bearing a 1,2-dioxetane precursor bound thereto, such that, upon exposure to singlet oxygen, said precursor is converted to a 1,2-dioxetane moiety bound to said biological moiety which 1,2-dioxetane moiety subsequently decomposes to release light.

2. A labeled non-biological probe, comprising:

a first non-biological moiety selected from the group consisting of a pharmaceutical drug, a non-pharmaceutical drug and a non-drug hapten, said non-biological moiety bearing a 1,2-dioxetane precursor bound thereto, such that, upon exposure to singlet oxygen, said precursor is converted to a 1,2-dioxetane moiety bound to said non-biological moiety, which 1,2-dioxetane moiety subsequently decomposes to release light.

3. An assay method to detect the presence of a target in a sample, comprising:

combining the labeled probe of Claim 1 with said sample under conditions which promote the formation of a single chemical entity in which said probe and any said target present in said sample are bound,

exposing said bound probe to singlet oxygen to form said 1,2-dioxetane moiety, and

detecting light emitted by said dioxetane upon decomposition thereof, wherein said light emitted is indicative of the presence and amount of said target.

4. A method of conducting a gel migration assay for analysis, comprising:

combining a labeled probe of Claim 1 or 2 specific for a target with a sample to be inspected for the presence of said target,

distributing said combined sample and target on a migration gel,

inducing separate components of said sample and said probe to differentially migrate across said gel,

exposing said probe to singlet oxygen to form said 1,2-dioxetane moiety, and

inducing said 1,2-dioxetane moiety to decompose and release light, wherein said light release is monitored, and that portion of the gel wherein light release is observed is identified, and any said target will be present in said identified gel.

5. A method of conducting a size base sequence analysis of a nucleic acid sequence, comprising:

enzymatically digesting said sequence to obtain nucleic acid sequence fragments,

functionalizing a terminal end of each said fragment so as to bind a 1,2-dioxetane precursor moiety thereto,

causing said functionalized fragments to differentially

migrate across a gel,

exposing said precursor moieties to singlet oxygen so as to convert said precursor moieties to 1,2-dioxetane moieties bound to said fragments, causing said 1,2-dioxetanes to decompose and chemiluminesce, wherein said chemiluminescence is monitored, and each portion of said gel wherein chemiluminescence is observed contains a fragment which may be eluted therefrom.

6. A labeled probe, comprising:

a first moiety selected from the group consisting of a nucleic acid, peptide nucleic acid, protein, steroid, carbohydrate, pharmaceutical drug, non-pharmaceutical drug, and a non-drug hapten, wherein said first moiety corresponds to a target component of a sample, said first moiety bearing bound to it a 1,2-dioxetane moiety which, upon exposure to a suitable trigger, decomposes to release light.